

REMARKS

Applicant has proposed amendments to the specification. In particular, Applicant has proposed amending the title to "IMAGE PROCESSING APPARATUS FOR ESTIMATING MOTION OF PREDETERMINED FEATURE POINT OF 3D OBJECT."

Applicant has also proposed amendments to claim 1. The amendments to the specification and to claim 1 are fully supported by the application as originally filed, and no new matter is introduced by this response. Upon entry of the amendments, claims 1-40 will be pending in this application, with claims 1-10 and 23-29 under examination.

The Office objected to the specification, alleging that "[t]he title of the invention is not descriptive," and that a "new title is required that is clearly indicative of the invention to which the claims are directed." Final Office Action at 4. Applicant has proposed amending the title to "IMAGE PROCESSING APPARATUS FOR ESTIMATING MOTION OF PREDETERMINED FEATURE POINT OF 3D OBJECT." Accordingly, Applicant respectfully requests the withdrawal of the objection to the specification.

The Office rejected claims 1-9 and 23-29 under 35 U.S.C. § 102(b) over J. Heinzmann and A. Zelinsky, "3-D Facial Pose and Gaze Point Estimation using a Robust Real-Time Tracking Paradigm," IEEE Int. Workshop on Automatic Face and Gesture Recognition, pp. 142-147, 1998 ("Heinzmann"). In making this rejection, the Office alleged that claim 1 was appropriately rejected under 35 U.S.C. § 102(b), and that the Applicant's previous arguments were moot because "the MPEP makes it clear that the 'teaches away' argument is not germane to a 35 USC 102 rejection (MPEP 2131.04)." Final Office Action at 3. In contrast to the Office's allegation, Applicant did not previously make a "teaches away" argument. The Federal Circuit has explained that to anticipate a claim, a reference "must not only disclose all elements of

the claim within the four corners of the document, but must also disclose those elements 'arranged as in the claim.'" *Net Money/IN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369, 88 U.S.P.Q.2d (BNA) 1751, 1758 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548, 220 U.S.P.Q. (BNA) 193, 198 (Fed. Cir. 1983)). Moreover, the reference "must clearly and unequivocally disclose the claimed [invention] or direct those skilled in the art to the [invention] without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference." *In re Arkley*, 455 F.2d 586, 587, 172 U.S.P.Q. (BNA) 524, 526 (C.C.P.A. 1972).

Amended claim 1 recites, among other things, a motion estimating means that "applies . . . estimates of . . . coordinates of [a] predetermined feature point to an observation function using a perspective transformation based on an observation model of [a] monocular camera to calculate estimates of an observation vector of the predetermined feature point." Heinzmann discloses using a perspective transformation for pose estimation of monocular data, and notes that "[t]he perspective transformation precisely models the actual projection of a 3-D scene to the image plane." Heinzmann, 144, col. 1, ¶ 5. But, in contrast to amended claim 1, Heinzmann does not otherwise teach use of the perspective transformation. In fact, Heinzmann points out that "the required calculations [of perspective transformations] are complex and time consuming and can deliver up to a fourfold ambiguity in the estimate of pose." *Id.* Thus, the rest of Heinzmann focuses on the use of affine transformations. As such, Heinzmann cannot anticipate amended claim 1 because it does not disclose all of the elements of amended claim 1 arranged as in amended claim 1.

Furthermore, the perspective transformation disclosed in Heinzmann cannot be combined with the disclosure in Heinzmann at page 146, column 1, paragraphs 1-2, and figures 1 and 3, which the Office cited as allegedly corresponding to a motion estimating means that “applies the estimates of the coordinates of the predetermined feature point to an observation function based on an observation model of the monocular camera to calculate estimates of an observation vector of the predetermined feature point.” Final Office Action at 7-9. The text of Figure 1 specifically refers to an “Affine Projection,” not a perspective transformation. And, page 146, column 1, paragraphs 1-2, and figure 3 rely on “the pose estimation of the head tracker described in the previous section” to determine the 3-D gaze vector in camera coordinates. While a perspective transformation is mentioned in the previous section, only an affine transformation is “described.” See Heinzmann, 144, col. 1 to 145, col. 1. Moreover, page 146, column 1, paragraph 1, refers to the feature triplets of the pose estimation. These feature triplets are used to solve the twofold ambiguity of pose, which is introduced by the use of affine transformation. *Id.* at 144, col. 1, ¶ 5 to 144, col. 2, ¶ 2.

For the above-discussed reasons, Heinzmann fails to disclose at least a motion estimating means that “applies . . . estimates of . . . coordinates of [a] predetermined feature point to an observation function using a perspective transformation based on an observation model of [a] monocular camera to calculate estimates of an observation vector of the predetermined feature point,” as recited by amended claim 1. Therefore, Heinzmann does not disclose each and every element set forth in amended claim 1, or its dependent claims 2-9 and 23-29. Accordingly, Applicant respectfully requests the withdrawal of the 35 U.S.C. § 102(b) rejection of claims 1-9 and 23-29.

The Office also rejected claims 1-10 and 23-29 under 35 U.S.C. § 103(a) over Heinzmann in view of Park, K. R., et al., "Gaze position detection by computing the three dimensional facial positions and motions," Pattern Recognition, Vol. 35, No. 11, Nov. 2002, pp. 2559-2569 ("Park"). In particular, the Office alleged that the Applicant's previous arguments regarding the obviousness of claim 1 were moot, and relied on Park for its disclosure of perspective transformation and Kalman filtering. Final Office Action at 3, 4, 14, 15. Because many of the alleged teachings of Heinzmann are tied to affine transformations, they cannot be combined with the perspective transformations disclosed by Heinzmann and Park. Moreover, even if such combinations were possible, they would render Heinzmann unsatisfactory for its intended purpose. See M.P.E.P. § 2143.01(V).

Heinzmann proposes a "system capable of tracking a face and estimating the 3-D pose and the gaze point all in a real-time video stream of the head." Heinzmann, 142, col. 1, ¶ 1. Heinzmann, however, notes that "the required calculations [of perspective transformations] are complex and time consuming." *Id.* at 144, col. 1, ¶ 5. Therefore, modifying Heinzmann's alleged disclosure of a motion estimating means to "appl[y] . . . estimates of . . . coordinates of [a] predetermined feature point to an observation function using a perspective transformation based on an observation model of [a] monocular camera to calculate estimates of an observation vector of the predetermined feature point," as recited in amended claim 1, would render Heinzmann unsatisfactory for its intended purpose. Accordingly, the alleged disclosures of Heinzmann and Park cannot be combined to remedy the above-discussed deficiency of

Heinzmann. Applicant, therefore, respectfully requests the withdrawal of the
35 U.S.C. § 103(a) rejection of claims 1-10 and 23-29.

Applicant respectfully submits that entry of this response is proper under
37 C.F.R. § 1.116 in order to place the claims in condition for allowance, or in better
form for appeal.

In view of the foregoing amendments and remarks, Applicant respectfully
requests reconsideration of this application and allowance of claims 1-10 and 23-29.

Please grant any extensions of time required to enter this response and charge
any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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